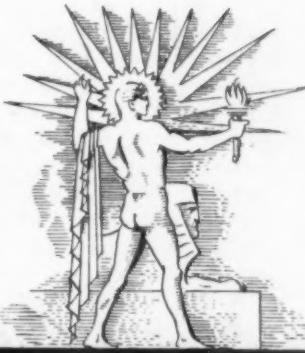


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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



July 23, 1938

Strange Sails

See Page 57

A SCIENCE SERVICE PUBLICATION

Do You Know?

Indians of some tribes used the jimson weed as a source of anesthetic in surgery.

The only land under the United States flag ever visited by Columbus was Puerto Rico.

It sometimes takes a century to grow one of the dwarf trees so admired in Oriental gardens.

Peru and Ecuador dispute ownership of a triangle of land consisting of over 117,000 square miles.

Ivy poisoning may develop within a few hours after contact with poison ivy or it may not appear for several days.

Glass wool made from quartz sand is reported to stand very high temperatures, thereby making it useful in insulation.

The so-called eye teeth have no special connection with eyesight; but, like other teeth, the eye teeth may cause eye trouble if they become infected.

A pine tree that started life in an over-crowded grove grew three times as fast after the land was thinned, as proved by its tree ring record.

A Michigan zoologist reports finding poplar trees cut and dragged by beavers over a measured distance of 650 feet—400 feet is considered an unusually long distance for beavers to haul wood.

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QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

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VOLCANOLOGY

How do scientists sample a volcano's breath? p. 57.

The most deadly snake venom, compared drop for drop, is that from the Tiger Snake of Australia.

Saliva as an indicator of tooth health and general health is being studied at the University of California College of Dentistry.

The whole of China had only about 6,000 miles of railroad before the Japanese invasion, which is less than the United States had in 1850.

The potato was grown in Peru in prehistoric times, but Indians in Mexico never saw this vegetable until a Spanish monk brought it from Peru.

Thousands of cattle die every year from licking fresh paint off farm buildings.

Some of the trees that are technically softwoods produce lumber harder than many hardwood trees.

The new technique of gardening with chemicals, without soil, is being tried by youngsters at the Brooklyn Children's Museum.

Children do not outgrow cross-eyes, says an eye specialist—the condition nearly always grows worse unless corrected by glasses, training, or an operation.

zines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

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PHYSICS

New Trap For Cosmic Rays Catches Historic Picture

Entering With 10,000,000 Electron-Volt Energy, Ray Strikes Glass Plate and Emerges Only to Die

USING a new and novel trap for catching piercing cosmic rays, Nobel Prize winner Dr. Carl D. Anderson and his colleague, Dr. Seth Neddermeyer, have obtained a photograph which will some day be historic. It shows a powerful cosmic ray particle with 10,000,000 electron-volt energy entering the apparatus and emerging with an energy of only 210,000 electron-volts. But, most unusual, the particle actually came to rest within the range of the camera and its stopping is recorded.

Measurements indicate the particle is the so-called heavy electron with a mass some 240 times as great as that of the

ordinary electron, basic unit of electricity.

Although the photograph does not actually show it, Drs. Anderson and Neddermeyer suggest (*Physical Review*, July 1) that the heavy electron came to rest and then disintegrated into a positive electron with ordinary mass.

The new cosmic ray trap, developed at the California Institute of Technology, consists of a special form of a device known as a Wilson cloud chamber in which the tracks produced by the speeding cosmic rays are made visible as they serve a nuclei of condensation of water vapor in the chamber. Through

a window a photograph of these tracks can be taken.

In the usual plan electrical counters near this chamber detect the presence of a cosmic ray and set off the camera mechanism. In the new apparatus, however, these detectors, called Geiger counters, are supplemented further by still another counter inside the cloud chamber itself. This arrangement favors the probability of observing cosmic ray particles near the ends of their ranges when their energies are weak. That the device actually photographed a cosmic ray particle as it stopped and came to rest was a fortuitous happening.

Science News Letter, July 23, 1938

PUBLIC HEALTH

Death Rate Increases During Heat Waves

DURING a heat wave a four-fold increase in the death rate over the expected death rate may occur, although not all the excess deaths are due to sunstroke or heat prostration, Mary Gover, associate statistician of the U. S. Public Health Service, points out in *Public Health Reports*, (July 15) issued by the Service.

The heat may be certified as responsible for about one-quarter of the excess deaths, as in Kansas during July of 1934, but during a heat wave there are also more than the expected number of deaths from heart diseases, cerebral hemorrhage, kidney disease and pneumonia.

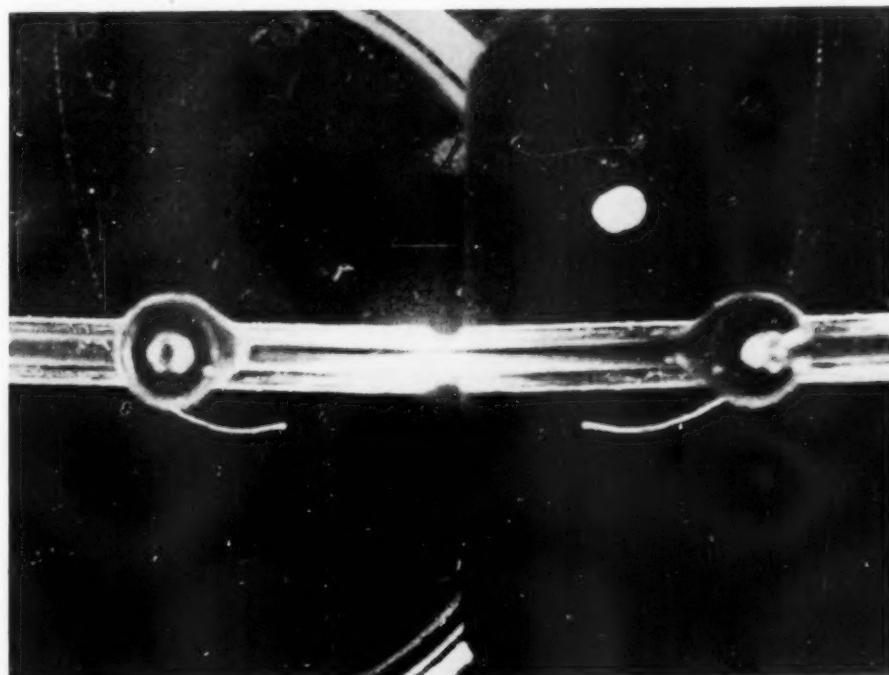
First Most Fatal

If two heat waves strike a community during one summer, there will not be nearly so many excess deaths during the second one, Miss Gover found. This may be partly due to the fact that most of the deaths among persons with chronic disease of heart and circulation were hastened during the first hot spell. It may also be due to acclimatization.

Sharp increases in mortality related to heat waves occur most frequently in July and in the states of Ohio, Indiana, Illinois, Missouri, Iowa and Nebraska. North Atlantic cities are also frequently affected. Least affected are the Pacific Coast and the far South. Miss Gover attributes the few excess deaths in the South to acclimatization.

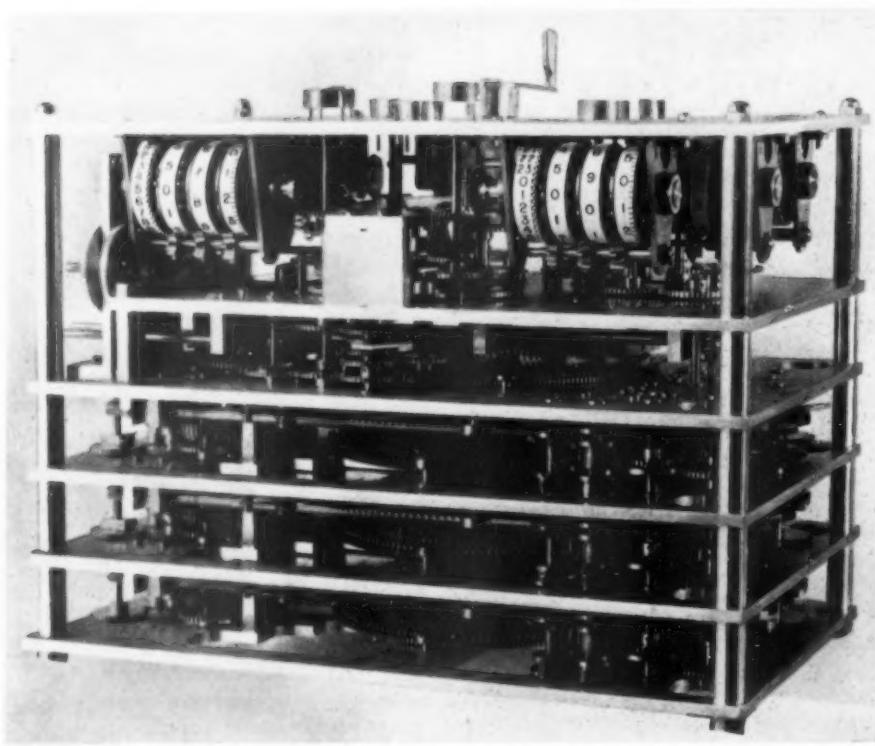
A number of consecutive days of extreme heat have more effect on the death rate than variable temperatures.

Science News Letter, July 23, 1938



DYING COSMIC RAY

Here is the unretouched photograph of the cosmic ray particle which pierced the special Wilson Cloud Chamber apparatus of Drs. Carl D. Anderson and Seth H. Neddermeyer and then came to a full stop. The photograph is stereoscopic and, if viewed with a modern variation of Grandma's old stereoscope, shows the cosmic ray tracks standing out in three dimensions. The dotted-line track coming from the top is the track of the incoming particle carrying 10,000,000 electron-volts. After passing through the glass plate at the center of the picture, the track is much wider and curved, for the particle is nearly "dead"; its energy has dropped to only 210,000 electron-volts.



FINDS LOCATION

With this mechanical computer of latitude and longitude, Howard Hughes could quickly find his location at any time on his record-shattering flight.

AERONAUTICS

Round-The-World Flight Gave Test To Navigation Robot

**By Turning Dials With the Ease of Radio Tuning,
Aviator Can Know Accurately His Location at Any Time**

THE ARMY Air Corps' new aerial navigation mechanism, never before permitted to be used on a civilian airplane, is a major reason why Howard Hughes was able to shatter the round-the-world record so decisively; it has been learned exclusively by Science Service.

For more than two years Army experts at Wright Field, Dayton, Ohio, have been working with the compact and ingenious latitude and longitude computer, invented by W. L. Maxson. Trial flights in Army planes demonstrated the worth of the robot computer. And then along came Howard Hughes with his plans for the round-the-world flight; the supreme test of aerial navigation.

Loaned to Hughes by the Army was Lieut. Thomas Thurlow, in charge of the Wright Field's section charged with the development of experimental navigation aids for Army planes. Lieut. Thurlow understood the operation of the Maxson navigator better than any other man. In the Hughes flight he saw the ideal test for this robot aid. On the success, or failure, in the Hughes flight depended the installation of the mechanism in the Army's giant bombers.

While construction details of the Maxson navigator are still Army secrets, its operation can now be told. It computes rapidly and completely automatically, without the aid of any books or tables of star positions, the geographical position of an observer who has taken a

sextant altitude of a celestial body.

The observer takes his "shot" of the sun or a star and cranks this altitude up on the machine in the altitude dial. Next the observer cranks in the exact time of his observation, in Greenwich Civil Time, on the G.C.T. dial and the date on the date dial.

Next (and all this takes less time to do than it takes to describe how to do it) the observer cranks in some rough longitude or latitude on the proper dial. Assuming he cranks in a longitude, the observer then cranks the latitude dial until another dial, marked "synchronize," registers zero. At this point the latitude and longitude readings will have changed until they represent one point on a line along which the observer's position lies.

Second Point

By repeating the process, assuming a different longitude, and again cranking the latitude dial until zero shows again on the synchronize dial, there is obtained a second point on the line along which the observer's position must be. This line, fixed by the two points, is all the information which any method of navigation can determine from a single observation of a celestial body.

To determine the exact position along this line, it is necessary to take a second sight on a celestial body and by repeating the cranking technique twice a second line is determined. Where these two lines intersect is the position of the observer.

All this sounds complicated but the twisting of the dials is no more difficult than tuning a radio set and just as quick. Errors of computation are avoided for the answers come out right if the proper numbers are set up on the dials.

While the Hughes flight is a remarkable tribute to powerful and reliable motors, a splendid plane, infinite ground crew preparation and very superior personnel, it is to this robot navigation computer that much of the success of the flight is credited. No matter how well a plane may fly, or how easily, it matters little if the navigators cannot, at all times, exactly fix the plane's position and plot the proper direction over distances of thousands of miles.

Science News Letter, July 23, 1938

The National Health Survey has measured hearing of a representative group of the American population, in 12 cities—the first time this has been done with precision instruments.

CHEMISTRY

Fertility Vitamin E Made After 16 Years of Research

Fed to Sterile Female Rats, Laboratory-Made White Powder Enables Them to Have Live Normal Babies

THE "essence of fertility," vitamin E, has at last been identified chemically, made in the laboratory and reduced to a chemical formula.

This culminates 16 years of research on the fertility vitamin. The achievement is announced in three highly technical papers in the journal, *Science*, (July 8) with some seven American scientists from three institutions participating.

Synthetic vitamin E, a white powder chemically named alpha tocopherol, when fed to sterile female white rats allows them to have normal babies as though they had never been deprived of natural vitamin E such as occurs in many foods.

The chemical part of the work is reported by Drs. Lee Irvin Smith, Herbert E. Ugnade and W. W. Prichard of the University of Minnesota School of Chemistry, and Dr. Oliver H. Emerson of Merck and Company Research Labora-

tories and the Institute of Experimental Biology at the University of California. At this same Institute the effect of the synthetic vitamin on animals was determined by Drs. Herbert M. Evans, Gladys A. Emerson and Oliver H. Emerson.

A number of other scientists have been working on the chemistry of this vitamin. Dr. P. Karrer of Switzerland, and his associates, H. Fritzsche, B. H. Ringier and H. Salomon, have also synthesized it.

Dr. Evans discovered vitamin E as the result of investigations begun 16 years ago.

Some physicians have reported that wheat germ oil, rich natural source of vitamin E, has helped some women to bear children, although they had been unable to bear living children before the vitamin treatment. Without the vitamin, Dr. Evans has found, female rats grow and are apparently not hurt in any

way except that they are sterile. When mated, their unborn young die. In male rats the reproductive germ cells all die when the animals are deprived of the vitamin.

Alpha tocopherol is apparently identical with vitamin E, but other chemicals, among them durohydroquinone, have been obtained which when given in larger amounts have a vitamin E-like action. This is not surprising, Dr. Evans points out, since it has already been well established that several chemical substances function as vitamins A and D respectively, and the same holds true for certain hormones or glandular products.

Science News Letter, July 23, 1938

BIOLOGY

Lindbergh Glass Heart Uses Blood of "Living Fossil"

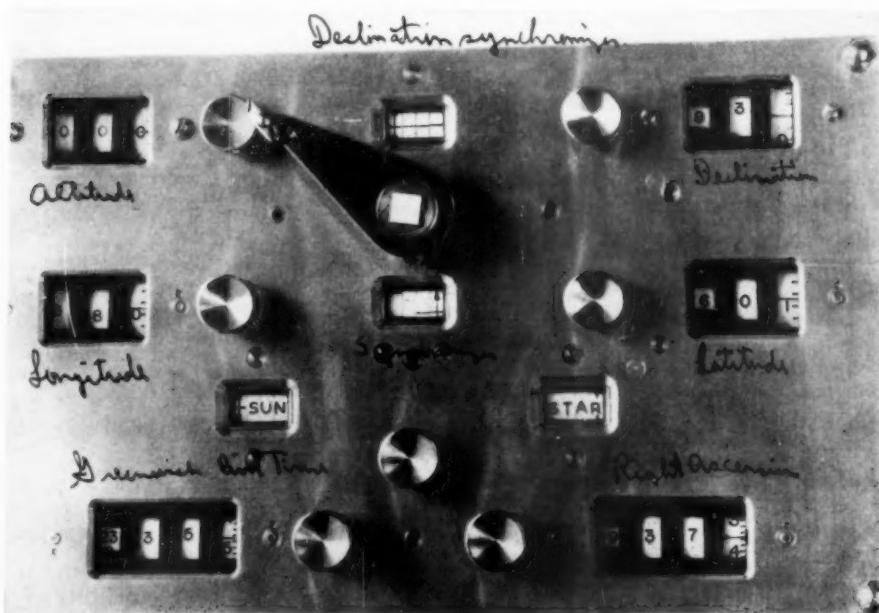
NEWEST triumph of Col. Charles Lindbergh's "glass heart" apparatus, in supplying oxygen along with the fluid it circulates to organs living outside the body, is accomplished by using blood of what might be termed a living fossil. And blue blood at that.

The creature that supplied the blood is a member of one of the oldest zoological aristocracies on earth, the horseshoe crab. Horseshoe crab shells are familiar to every stroller along the sea beach. They look somewhat like crabs, but are considerably more primitive, and they have a history running back hundreds of millions of years. They may even be ancestral to the rest of us, through a race of sea animals long since extinct, the ostracoderms.

The problem of supplying oxygen through the fluid in the "glass heart" long had the experimenters stymied. They found they could not use hemoglobin, the red pigment of ordinary vertebrate blood, because it very quickly broke down into a compound that would not carry oxygen, called methemoglobin.

Then, relates Dr. Richard Bing of Columbia University and the New York Presbyterian Hospital, it was decided to try the blood pigment of the horseshoe crab, a blue stuff known as hemocyanin. A lot of crabs had to be sacrificed to get a sufficient supply of blood, for each crab yielded only about 100 cubic centimeters, or a scant half-teacupful.

The blood itself was not used, but the hemocyanin was extracted and purified through a long series of chemical steps. When it was added to the circulating fluid in the right proportions it worked quite successfully, keeping various mam-



EASY OPERATION

Like the dials of your radio set, the knobs of the robot navigator are easily twirled to give the aviator his position in the trackless airways.

malian organs like kidneys and thyroid glands alive for several days.

Hemocyanin contrasts oddly with hemoglobin in one respect. Hemoglobin containing oxygen is bright red, and

when the oxygen is gone it turns blue. Hemocyanin is blue when oxygenated, and when its oxygen is exhausted it has no color at all.

Science News Letter, July 23, 1938

GEOLOGY

New Gold Strike Comes To Nevada; Rich Ore Found

Between 500 and 600 Claims Staked Out on Four-Mile Range; Ore Worth Up to \$2,000 a Ton Near Surface

DISCOVERY of high-grade ore running up to \$2,000 a ton in value on new claims has precipitated a gold rush to Cimarron District, 29 miles north of Tonopah, Nev., opening up a new field destined, perhaps, to create a boom camp equal to the old days of the roaring west.

Since E. M. Booth, soldier of fortune, made the rich strike last month between 500 and 600 claims have been staked out over a mineral range four miles long.

The range is part of the geological upheaval which made Tonopah and Goldfield such fantastically rich gold camps.

Surface showings of the new strike are so phenomenal that ore with values up to \$2,000 a ton is being encountered 20 feet below the surface of a 7,500-foot peak. Shrewd and conservative mining men predict that the strike could easily surpass Goldfield and Tonopah, both teeming mining camps in their heyday, producing some \$500,000,000 in gold together.

Nevada has not had a strike in more than a decade that has created so much excitement as have values uncovered in the Cimarron District.

Less than a month ago 12 of the 16 claims staked out by Prospector Booth and his wife were purchased by Pacific Butte Mines Company for \$185,000, in addition to other considerations, bringing to him the realization of a lifetime dream to strike it rich.

The company, headed by Fred Vollmar, veteran Silver Peak mine operator, now is driving a 500-foot cross-cut tunnel through the center of the rich claims which cover an area of approximately one mile square. This tunnel is now over 75 feet long. Booth panned a wide section of the mineral range and believes that he staked the heart of the district which he named Cimarron.

The cross-cut is being driven into the mountain 200 feet below the high-grade strike, much of which is free gold, and within a few feet of where Mrs. Booth struck a vein that assayed \$168 a ton.

From surface showings, Booth has concluded that the cross-cut will top five veins, and possibly two more which he suspects exist.

The purpose of this tunnel is to determine the width and depth to which the veins go into the earth. Should the cross-cut verify surface showings officials plan immediate construction of a mill capable of handling 2,000 tons of ore daily, making it the largest gold operation in the state.

Charley Taylor of Tonopah, who retired years ago after making a fortune in Goldfield, declared that Cimarron has better showings than either Tonopah or Goldfield at the start. He said Cimarron might easily surpass the other two fields. Tonopah produced at least \$270,000,000 in gold and silver, and Goldfield yielded \$155,000,000.

Twisting roads to the diggings are now being scraped and graded so that mining equipment may be brought in. A tri-weekly air service is being started between Los Angeles and Tonopah to carry interested mining operators. Five tons of mine rails, large air pipe, ties and lumber have already been carried into the region from Tonopah, indicating that extensive work is under way.

Science News Letter, July 23, 1938

SOCIOLOGY

England's Older Men Face Lifetime of Unemployment

THOUSANDS of men seeking eagerly, despairingly, for work will never work again.

That is the problem that a nation must face when it is brought to accept long unemployment as an inevitable burden. That is the human story just coming out of England in the report of a painstaking research, "Men Without Work" (Macmillan), made to the Pilgrim Trust.

The older man in England is not willing to do without work. He doesn't want the dole. To him, financial independence is a necessity like his bread and ale. His home, his own home, is a castle to be defended against all attacks of fate. When forced to accept aid he still pays insurance so that death at least may be independent.

"I am respectable," he says of himself proudly.

Yet to reconcile older men to state support is the duty of England's social scientists today, it is believed.

"Until measures are taken to create work for these older men, it is most desirable that they should be able to adjust themselves to the probability of not doing much work again for the rest of their lives." So reads the report to The Pilgrim Trust. And it is a problem indeed to facilitate that adjustment.

Many of them feel, the investigators found, "that they cannot be satisfied with the rest of their lives lived out 'on the dole.' "

"Anyone who has visited a number of these older men, and knows the hopelessness of men faced with an empty future—whom neither education nor work has ever given an opportunity to learn how to spend leisure—knows the urgency of their case," warns this very human document.

"Five years in a man's life is a long time; and if at the end of five years' uncertainty there is only (as there is now) the certainty of a pension at a yet smaller rate, it is a fate that can scarcely be tolerated."

"The ordinary working man is not very easily moved, and the sight of some of these older men, broken down and unable to speak for the moment as they looked ahead into the future, is not one that will be soon forgotten."

Science News Letter, July 23, 1938

In Greek law courts, speakers were timed by water clocks.

• Radio

Every Friday at 7:30 p. m. EDT, 6:30 p. m. EST, 5:30 p. m. CST, 4:30 p. m. MST, or 3:30 p. m. PST, Science Service cooperates with the Columbia Broadcasting System in presenting over the Columbia coast to coast network a new series of "Adventures in Science" presenting dramatizations of important scientific advances and discussions by eminent scientists.

MEDICINE

Sunburn-Preventing Ointment Developed to Specifications

Skin Colored Cream Made of Substances Selected After Tests of Their Ability to Bar Burning Rays

A SUNBURN-PREVENTING ointment developed according to scientific principles and which in preliminary tests actually screened out all the sunburn rays of the sun has been prepared by Drs. B. Fantus, A. Bachem and H. A. Dyniewicz of the University of Illinois College of Medicine.

"Cuticolor Ointment" is the name suggested by the scientists for this sunburn preventive because "skin color is its most striking quality."

The ointment is made of calamine, woolfat, yellow petrolatum and rose water. These are all official pharmaceutical substances which are readily obtainable by any pharmacist. The exact formula appears in a report of Merck and Company, which assisted the research financially.

The ingredients were selected as a result of a systematic evaluation of the ability of various similar substances to

screen out the rays that produce sunburn. Woolfat, yellow petrolatum, a mixture of these two, and diacholyn ointment were found most efficient, while tragacanth paste, vanishing cream, cold cream and white petrolatum were relatively worthless.

Calamine was added because, since it would be desirable to use the ointment in a very thin film, it seemed that the addition of an opaque substance like a powder would increase the protection. Calamine was selected because of its efficiency in screening out actinic rays of the sun and because of its skin color and cheapness. Rose water was added to overcome the greasiness of the ointment base and to give it perfume.

This ointment and seven sunburn protectants obtained on the open market were spread in films of identical thickness on a photographic plate and exposed to light from a cold quartz mer-

cury lamp. The light rays from this lamp all lie within the range of those that cause sunburn. When the plate was developed it showed that the new ointment screened them all out, whereas the other seven anti-sunburn preparations only screened out part of these rays.

Science News Letter, July 23, 1938

PHYSIOLOGY

Man's Future Depends on What He Decides to Eat

ACH of us is called on to make an important decision three times every day: What we shall eat for dinner, for breakfast and for lunch. Man's future depends very largely on what he decides to eat. That prediction comes from no less a person than Dr. George R. Minot of Boston, Nobel laureate, who discovered that liver would cure pernicious anemia.

Scientists have learned what should be eaten for good health and growth and even for long life and improvement of the race.

Foods that are filling and energy-giving, like meat, potatoes and bread, are not enough. In addition, the diet should include what are called the "protective foods," because they protect us from serious ailments such as scurvy and beri-beri and rickets, and from many minor degrees of undernutrition and poor health. Fresh fruits and vegetables and dairy products are protective foods. Statistics of food supply for the past two decades show a shift toward greater consumption of these protective foods. This shift is now being credited with having kept up the public health through the years of the economic depression. It is because of this shift, also, nutritionists believe, that boys and girls are entering college better developed at a slightly earlier age than their fathers and mothers.

Not enough of us, however, are making the three-times-a-day decision as wisely as might be. About half of us are eating a third-rate diet, a survey by Dr. Hazel K. Stiebeling of the U. S. Bureau of Home Economics revealed. The reason is not all a matter of pocket-book either. As might be expected, diets were very poor in families where the total food expenditure was \$85 per person per year. But at every spending level above \$100 per person per year some families succeeded in getting very good diets.

Science News Letter, July 23, 1938



ANTARCTIC COMES TO CHICAGO

These lifelike Weddell's seals are in a habitat group at the Field Museum of Natural History. They were collected near the south pole by Rear-Admiral Richard E. Byrd's second expedition.

Birds are more lively just after dawn than at any other time of day.

PHYSICS

Ping Pong Balls Aid in Recording Cosmic Rays

SENDING instruments eighteen miles up into the stratosphere, scientists of the California Institute of Technology, headed by Dr. Victor Neher, have just launched the newest study of cosmic rays direction and intensity at Oklahoma City.

Strings of small hydrogen-filled balloons bore aloft the delicate apparatus which will automatically register cosmic ray intensity. The equipment rises until one or two of the small balloons burst and then the rest bring it slowly and safely to the ground, to be returned by farmers for a small reward.

Tiny ping-pong balls play an important role in the equipment, said Dr. Neher, being used to reflect light into a small camera which takes robot pictures of the instrument readings while the flight is in progress.

Science News Letter, July 23, 1938

LANGUAGE

Hebrew Speeches at Last Recorded in Shorthand

SPEECHES in Hebrew language can now be taken down in shorthand.

At recent Zionist congresses in Jerusalem, a system of Hebrew stenography devised by J. Maimon proved fast and flexible enough to capture the proceedings. A daily newspaper in Hebrew reported happenings of the congress with all the speed of convention news in America.

Mr. Maimon himself, commenting on usefulness of this recording aid for Zionist life in Palestine, says:

"Hebrew stenography has apparently passed its infant stage. There is no doubt that if it will progress in the future at the same rate as during the past two years, the time will soon come when a knowledge of Hebrew stenography will be required of every typist seeking employment."

It may seem odd that Hebrew has not had speedy recording before. Shorthand is so old.

Cicero's secretary Tiro took down speeches by merely abbreviating well known words and leaving out what his good memory could supply. Orators repeated so shamelessly, Tiro often made one bored sign stand for a sentence.

The idea, of course, has gone through many stages to reach the glib efficiency of the modern stenographer's pen. Today, an international system has been

adapted to 24 languages—Hebrew being the latest.

Hebrew presents peculiar difficulties. Mr. Maimon explains that when he came to Jerusalem in 1922 he found existing Hebrew shorthand systems impractical. Familiar with German shorthand, he tried fitting its outlines to Hebrew sounds and in 1924 took down a speech lasting an hour and a half. He continued to take down hundreds of lectures. Adapting the international system gave better results, and when students demanded lessons, in 1929, he produced a textbook. By 1931, the first stenographer, besides himself, was able to do fast recording.

Science News Letter, July 23, 1938

PHYSICS

Tunnels Are Scene of Latest Cosmic Ray Study

CHICAGO'S unique freight tunnel system underneath the Loop and the downtown district is the newest scene of cosmic ray research.

Prof. Arthur H. Compton, Nobel prize winning physicist of the University of Chicago, has just announced experiments conducted in a tunnel 50 feet beneath Chicago streets which showed cosmic rays penetrating to that level are heavy electrons known as barytons.

The apparatus was set up in a tunnel within a few blocks of the downtown Loop. Experiments were conducted by Volney C. Wilson under Prof. Compton's direction. These experiments are to show that electrically neutral rays known as neutrinos play no important part in cosmic ray effects in regions from sea level down through fifty feet or more of rock, Prof. Compton said.

"The rays prominent at these levels are probably barytons or heavy electrons. There is little evidence, if any, to make us doubt this. It is of especial interest to note that the rays which are thus identified as the most important part of the cosmic rays which we found about us consist of a kind of matter which was unknown on the earth previous to the cosmic ray study," he declared.

Prof. Compton explained that recent investigations indicated the presence in cosmic rays at sea level of a type of particle having the charge of an electron but a hundred or two hundred times as much mass. These particles are called barytons. Last summer in a copper mine in northern Michigan Mr. Wilson ascertained that cosmic rays could penetrate 1,600 feet of rock.

Science News Letter, July 23, 1938



PUBLIC HEALTH

Malnutrition Plague Called Major World Wide Problem

WHEN do we eat enough and properly?"

That is one of the world's major questions today. There is no major famine plaguing mankind today, but the specter of hidden hunger is abroad in the world.

Millions of people in all countries are suffering from malnutrition. That means, not getting enough of the right kind of food to eat. It means little children who are unnecessarily sick, boys and girls with bad teeth, people who lack energy to do more than merely exist.

The magnitude of the problem is emphasized by a report of a committee of the League of Nations that has had the aid of experts from many countries during the past two years.

The surprising thing about this condition is that, as the League committee notes, it can exist in a world in which agricultural resources are so abundant and agriculture is so perfected that supply frequently outstrips effective demand. Quite evidently it is a problem for the statesman and international cooperation rather than merely a concern of the farmer, the food merchant and the housewife.

Improved nutrition means more use of what the dietitians call "protective" foodstuffs, such things as milk and vegetables. Because these are perishable they must be produced near where they are eaten. That means diversified local farming.

But there are larger potential markets for the corn and wheat growers, too, because not every one has enough of these energy-producing foods.

How to fight the hidden hunger plague:

Tell the people about the right kinds of food to eat. Lower the cost of food. Let governments see to it that their populations are fed adequately, even though this means direct grants. The League committee is confident that in the long run such a program with a low relative cost would save incalculable suffering and economic loss.

Science News Letter, July 23, 1938

SCIENCE FIELDS

PHYSICS

Novel Windmill Sailboat Is Propelled by Rotor

See Front Cover

THE NOVEL "windmill sailboat," designed by Burk Wilford of Philadelphia, which is shown on the front cover of this week's SCIENCE NEWS LETTER, uses a rotor to move it through the water instead of the conventional sail. The rotor is set at an angle to the wind and the blades begin to revolve, pulling the craft through the water. A hand lever controls the angle at which the rotor is set, while a brake enables the "windmill" sailors to stop the boat by stopping the rotor. The boat can go backwards as easily as forward.

Science News Letter, July 23, 1938

BOTANY

Devil's Shoestring May Start New Insecticide Industry

DEVL'S shoestrings trail along the whole southeastern seaboard of the United States, from New England to Texas. They aren't of any use now, but in time to come a new American industry may start from them. Promise has been counted good enough, at any rate, to justify the spending of considerable research time on the project, by a team of six scientists. The U. S. Department of Agriculture tells what they found in a new technical bulletin.

Devil's shoestring is a plant. It belongs to the pea family, and it is known by such other names as rabbit bean, turkey pea, and goat's rue. Botanists call it *Tephrosia*. It looks rather like a vetch, only bigger.

In the tough, woody roots of devil's shoestring chemists have found the same compound now obtained from the roots of derris and cubé, imported in quantities from the East Indies and tropical America, for use in making sprays to kill flies, mosquitoes, and other insects. This compound is called rotenone. It is harmless to man and other warm-blooded animals, but deadly to insects; hence its popularity as a spray ingredient.

This discovery of rotenone in the

roots of devil's shoestring does not mean that an all-American insecticide industry can be built up overnight. A great deal of pioneering research must still be carried out, paid for either by the government or by private enterprise. Probably the government may do it.

Participants in the research reported in the new bulletin where A. F. Sievers, G. A. Russell, M. S. Lowman, E. D. Fowler, and C. O. Erlanson, all of the U. S. Department of Agriculture, and V. A. Little, professor of entomology at the Texas Agricultural and Mechanical College.

Science News Letter, July 23, 1938

AERONAUTICS

Single Indicator For Blind Landing Systems

ASINGLE indicator instrument for blind landing systems has been patented by Francis W. Dunmore, National Bureau of Standards scientist who has played a prominent part in research aimed at the development of a safe blind landing system for airplanes.

Two movable needles, at right angles to each other when the plane is on course and in varying positions when the plane is off course, feature the device which serves as a single indicator in place of the several previously required. It is covered by patent No. 2,119,530, assigned to the United States government and in that way made available to the aviation industry without royalty requirements.

The needles are controlled by radio signals sent out in such a manner that they define a proper path for the plane in approaching the airport. One beam, for example, indicates the proper direction. If the plane is on course, the vertical needle is in the center; if the plane is to the right of its proper path, the vertical needle swings to the right.

Mr. Dunmore's indicator is used in one blind landing system, the so-called Air Track system, which is due to receive extensive trials within the next year, and has already been installed at the Pittsburgh airport.

The horizontal needle, controlled by radio signals setting the proper altitude or glide path, moves above the proper position when the plane is above the path and returns to a proper position when the plane gets on course again.

The advantage of the device is fact that it substitutes reading one simple instrument for following a number of more complicated devices.

Science News Letter, July 23, 1938

VOLCANOLOGY

Volcanoes' Fiery Breath Sampled by Scientists

OFFICERS of the law upon the highway "sniff" the breaths of traffic troublemakers, to judge if anything inside them may be responsible for their dangerous propensities. Menaces though these citizens may be, such sampling of respiratory products must seem "sissy" to volcanologists. These scientific sons of St. George are satisfied with nothing short of bottlefuls of dragons' breath.

Prof. Stanley S. Ballard of the University of Hawaii, who is also research associate in geophysics in Hawaii National Park, tells in a new publication of methods for getting information about what goes on inside a volcano by capturing and studying the gases that come out of it.

The hottest parts of the volcano's breath, the gases that are actually flaming as they emerge, are of course uncapturable. Nevertheless, that does not mean that they cannot be examined. By turning the slitted telescope of a spectrograph on them as they glow, it is possible to split their light up into its component wavelengths and to get a record of these as lines on a photographic film for later measurement and interpretation.

Preliminary work of this kind has been done, but with instruments too small to give really valuable results. Prof. Ballard hopes to get a piece of scientific artillery of sufficient caliber to make a really telling assault upon the volcano's fiery citadel.

But actual samples of the gases themselves, that issue from fissures on the volcano's flanks and cracks in its crater floor, can be taken in suitable glass vessels, carried off to the laboratory, and put through the ordinary course of chemical analysis.

It is proverbial that "He who sups with the Devil must bring a long spoon." Volcanologists keep their distance by providing their sampling flasks with very long necks, and sometimes mounting them on poles as well. They poke the end of such a long-necked flask into the fuming volcanic vent. The flask has previously had its air pumped out; so when the seal is broken the gases rush into the vacuum. Then a stopcock is turned and they are trapped.

Science News Letter, July 23, 1938

Canada produces 22 metals important in world markets.

PHYSICS

X-Rays in the Grocery Business

From Its Task of Diagnosing and Healing Human Ills, This Powerful Tool Turns to Job of Inspecting Foods

By DR. FRANK THONE

X-RAYS were practically monopolized by the medical profession, when they first appeared above the horizon of science, some forty years ago. Their delicate surgical fingers probed for embedded bullets, traced the outlines of broken bones, showed the dentist where the bad tooth was. They turned their arrows of beneficent destruction on cancer growths.

A little later, having scored their success in surgery, they turned to engineering. Industrial plants all over the world know their activities in finding hidden flaws in the heart of solid metal castings and forgings. They search out forgotten wiring and plumbing in old buildings. They show positions of moving parts within complex mechanisms.

Now X-rays are going into the grocery business. They are concerning themselves with such everyday dinner-table matters as potatoes and meat and apples and oranges, and candy for the kids. They are becoming the shopper's friends, and the grocer's friends, too.

Judgments of quality applied to fruits and vegetables by the average competent housewife necessarily depend in the main upon surface qualities. She can tell a lot about a tomato or a cantaloup by looking at it, feeling it, smelling it. She can glance at the blossom end of an apple and make a pretty shrewd guess as to the likelihood of finding a worm (or half a worm), inside.

Invisible Ills

But there are some faults to which the flesh of even the most appetizing vegetables and fruits is heir that no human eyes, however expert, can detect. Who has not bought a juicy-looking, perfect-skinned orange, only to find it "wooden" inside? Or some nice big potatoes for baking, that had nasty, black-lined hollow hearts when they came to the table?

Blame for such faults, calamitous though they are when you have company and want everything to come off just right, cannot be fixed on the grocer, or on the wholesaler, or on the grower. They don't want to sell you such faulty produce, because they want to keep on

enjoying your business. They'd be just as glad as yourself for some dependable way of shunting such undesirable specimens off the road to market.

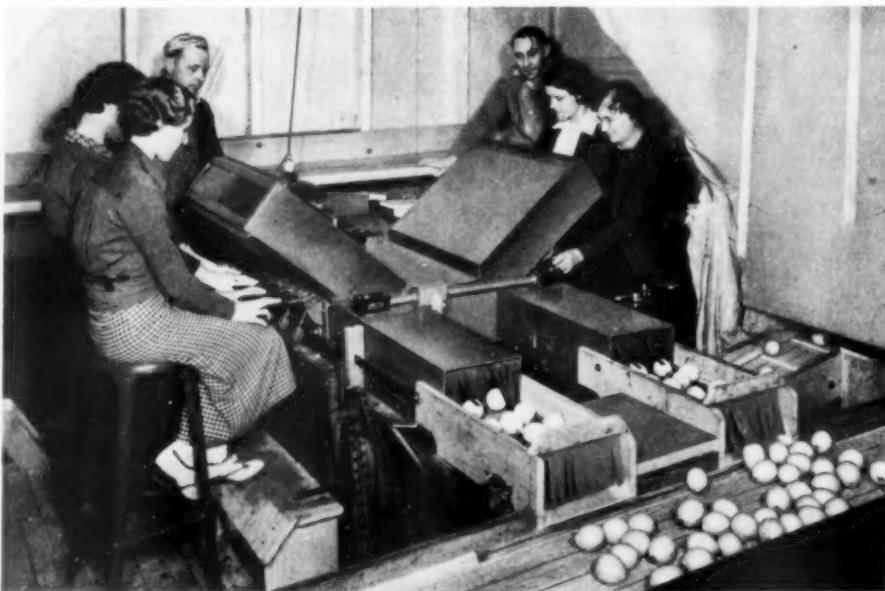
X-rays are used in the inspection of fruit, vegetables, and other foods very much as light has been used in the candling of eggs for many years. The egg candler has a special lamp (it used to be a candle) with an oval opening in one side of its solid metal chimney. He fits the eggs into this opening. If the light shines through with a nice, even glow, a little darker near the center where the yolk is, he knows the egg is good. If there are spots or mottlings, it is tossed into the can of "spots and rots."

But ordinary light, no matter how intense, will not serve for the "candling" of such opaque things as potatoes, grapefruit, and apples. Prof. R. B. Harvey, of the University of Minnesota, trying for some way of seeing to the heart of this marketing riddle, bethought him of the X-ray tube and the fluoroscope.

If you have ever had a really serious siege of indigestion, or something else wrong with your internal arrangements, you will remember how the doctor first fed you something with bismuth in it, and then pushed you up against a screen with an X-ray tube in operation on the other side of you. He could see a silhouette picture of your insides on this screen, which was coated with a substance that glows when X-rays strike it. This arrangement is called a fluoroscope. Maybe the doctor held up a mirror, so that you could conduct a survey of your own Department of the Interior.

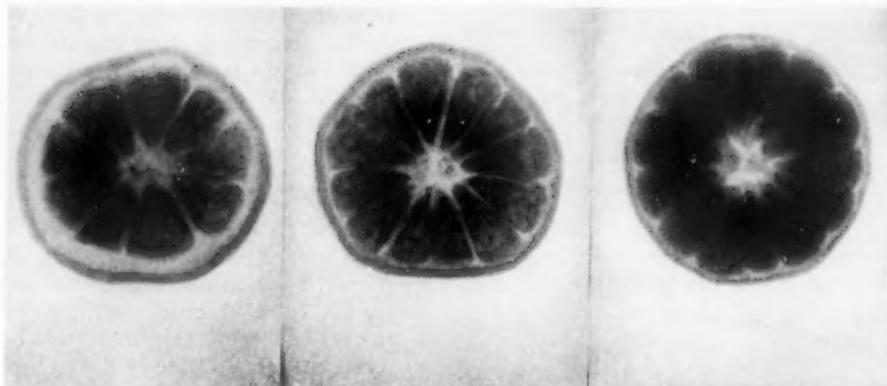
The fluoroscope is used not only in medicine but also in the industrial applications of X-rays, where visual inspection is wanted, rather than a photographic record. Why not, Prof. Harvey asked himself, use it on potatoes as well as on those who eat them? So he tried it, and it worked.

The Minnesota scientist reported his results before meetings of his colleagues as a job of research in straight science. But he was quite aware of its practical possibilities. Manufacturers of machinery for food handling and inspection have taken over the job of commercial



LOOKS INSIDE

Four young women using the same X-ray machine to separate "sheep" from "goats" in a citrus packing plant in California. A flick of the finger on the lever makes judgment effective. The "saved" fruit starts for market on the conveyor in the foreground; back of it, a smaller conveyor hustles the "lost" away to its doom.

**WHAT IT SEES**

These are X-ray photographs of tangerines: left, puffy; center, flesh granulated; right, normal.

distribution, and the machines are coming into use in a number of food industries.

There are differences in operation, according to the type of product being inspected, but fundamentally the machines are very much alike. At the heart of the apparatus is the X-ray tube. On either side is a slowly moving conveyor belt, carrying the fruits or vegetables. Above them are the inspectors, usually two on each side. Between inspectors and conveyor belts are the screens of the fluoroscope.

The inspectors, usually girls, alertly watch the procession of transparent shadows as they travel along the screens. So long as their appearance signals "normal" the girls make no move. But when a shadow shows up that shouts, "I'm a bad one," an operator flicks a lever with her finger. Out goes the imperfect specimen through a chute in the bottom, either onto the wasteheap or into such by-product uses as the particular industry may afford. The good ones stay on the conveyor belts and go their undisturbed way to market.

Danger in Use

Wherever X-rays are used, danger from continued exposure must be guarded against. The food-inspection machines are well insulated with plates of lead, which adequately protect the workers.

The machines have high capacity. The Food Machinery Corporation, of Riverside, Calif., state that one of their citrus inspection units is capable of handling, in an hour, from 100 to 150 field boxes of oranges, 70 to 90 boxes of lemons, 150 to 200 boxes of grapefruit, or 80 to 120 boxes of tangerines. Use of the machine has resulted in saving of as much as 30 per cent of batches

of suspected fruit, cast out as bad by earlier inspection methods but proved to be good by careful check-up.

Injuries that cause internal defects in fruits and vegetables without marring their outward appearance come from a number of causes, usually not from insect infestation or plant disease caused by bacteria or fungi.

Too Rigid Growth

Hollow heart of potatoes, for example, seems to be due merely to too-rapid growth. Ordinarily it is found only in big tubers that have grown under unusually favorable conditions of moisture and warmth. They grow so fast around the outside that they literally split themselves inside. Their skins remain smooth and unbroken, and nobody can suspect their inner flaw. There is nothing unwholesome about their flesh, but of course they are not good for any kind of whole cooking.

Big grapefruit sometimes show an analogous defect. Their segments will be separated from each other, or pulled loose from the central solid column. But with citrus fruits in general, concealed inner defects more often arise from other causes. When a sudden freeze hits the orchards, it may only partly kill the fruits. Some of the juices ooze out from the killed cells and subsequently disappear from the fruits, leaving them loose and puffy, with a disagreeable dryness about their pulps. The X-ray fruit analyzer can spot this condition every time, whether it affects the whole fruit or only one side of it.

Perhaps the most serious, at least the most frequent, of concealed internal defects in apples is a browning of the flesh, that usually occurs in a ring, following the small fibrous strands that stand out-

side the core. It seems to be due to some upset in the apple's own physiology, rather than to any germ or virus infection. This condition also the X-ray analyzer can detect.

X-rays can be used to good effect for the inspection of processed as well as fresh food products. In some of the modern types of packed hams, for example, the bone is broken for greater compactness. This is all right if the break is a clean one, as it usually is, but if a chip or splinter of bone breaks loose and becomes embedded in the flesh the consequences are apt to be unpleasant. X-rays can pick out such compound fractures in packing, and eliminate them from the marketed products.

Shot Found

It might not be a bad idea for hunters to run their ducks and rabbits over an X-ray meat inspector, so they would know where to expect leaden shotgun pellets. That would be a much more agreeable way of locating them than to find them suddenly with their teeth!

Akin to those unexpected duck-shot are the annoying white pebbles, just about the size and shape of the kernels, that somehow get into the best-regulated of salted peanuts. Or the accidental pins, small screws, or other bits of metal that may become embedded in candy bars, or lost in the fluffy interior of boxes of breakfast cereal. The X-rays can find these where other methods of inspection fail.

Hard foreign objects may cause mischief long before they get between our unwary teeth. A stray stone or piece of metal can become the traditional monkey-wrench in the works if it goes into the hopper of a coffee-grinder or a spice-mill. A method that can watch whole batches of food materials during processing can often make substantial savings in time and in expensive parts that might otherwise need replacement.

The whole possible gamut of uses of X-ray inspection in food handling and processing has by no means been realized. For instance, corn canneries might very well put an X-ray food analyzer between their delivery chutes and the husking machines, so that wormy or smutty ears could be eliminated at the very outset of the process, or at least detoured to a second processing line, where the defective parts of the ears could be cut away before they are mingled with the sound ones.

In pea and bean canneries one of the principal sources of trouble are little round white pebbles (*Turn to Page 61*)

Inexpensive Summer Fun— Mushrooms May Be Good But If They Are Bad—

(Sixth of a series of 12 articles. Next week—Collecting Rocks)



Toadstools and mushrooms—fungi, in a word,—are easy to collect and, in most cases, dry out well. As far as edibility goes—know your mushroom before you eat it. The Amanitas, typical of which is the second mushroom from the right, are poisonous; you can tell it by the cup at the bottom of the stalk, the ring around the stalk just under the cap, and the scales on top of the cap itself.

MUSHROOMS and toadstools are always objects of interest, if only for the question of edibility they always present. They are so tempting—and the bad ones are so dangerous! Like the little girl in the old rhyme, "when they are good they are very, very good, but when they are bad they are horrid."

But mushrooms, and other fungus growths in general, are excellent things to collect as a hobby. They are easy to get, and some of them at least are easy to keep—though it must be admitted that most fungi do shrivel somewhat when dried. But even at that, they make interesting specimens; and you'd never guess until you started collecting them how many and what varied kinds there are.

Collecting fungi is quite as simple as collecting mosses. Just pick them, lay them out in the open on sheets of newspaper until they are dried, and put them away in your boxes. Be sure to label them as carefully as you label

your herbarium folders of wildflowers or leaves.

You will find, with a little experience, that some kinds of fungi can't be collected successfully at all. The inky-caps and shaggy-manes, for example, dissolve into blobs of black fluid in a few hours and the curious growths known as Jew's-ears are too gelatinous to dry out well. On the other hand, there is nothing to spoil about a dry puffball, and certainly not about the hard, woody shelf-fungi that won't come loose from the trees they grow on unless you hit them with a Scout ax.

In between are the fairly firm types like the common field agaric (that is the one sold in stores), the odd-looking but very tasty morel (also called, appetizingly, the beefsteak mushroom), the honey mushroom and the oyster mushroom that grow out of trees, and the strange, many-toothed objects called coral fungi, that grow in the woods. All these and many more species besides, dry out

into satisfactory collection specimens.

Another interesting thing the fungus collector can do is make spore prints. Mushrooms and other fungi don't have seeds, but infinitely smaller things, called spores, that serve to distribute and propagate their species. These fall out from the gills or pores on the underside of the cap and are borne away in the air.

If you cut the stalk of a mushroom off short and lay the underside of the cap down flat on a sheet of white paper overnight, in the morning there will be an exact pattern of the gill or pore structure under it. Stick a pin or a fishhook or some other improvised handle into the cap before you set it down at night, so you can lift it in the morning without disturbing the spores. Spore prints can be made permanent by gently spraying them with the kind of fixative solution artists use to keep charcoal sketches from smudging.

For more information about collecting mushrooms and toadstools and a list of books and pamphlets on the subject, send us a postcard with your name and address. Ask for Bulletin 6. Address: Science News Letter, 2101 Constitution Ave., Washington, D. C.

Science News Letter, July 23, 1938

GEOLOGY

Using Snow Blanket To Preserve Mammoth

WARM weather of July on Wrangel Island, far inside the Arctic circle, is making difficult the preservation of the carcass of the extinct mammoth discovered there, Tass reports. A wire net and a layer of snow are being used as a make-shift, giant refrigerator to preserve the carcass and prevent its destruction by wild animals, until the expedition from the Academy of Sciences of the U. S. S. R. arrives to take charge of the rare find. The mammoths were a giant species of hairy elephant, long-extinct, which once roamed far into Arctic climes before the last Ice Age.

Science News Letter, July 23, 1938

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From Page 59

that get through sieves because they are so nearly like the vegetables with which they are mixed. X-rays would help to eliminate these jawbreakers.

X-rays might possibly be used also on the finished packages, cans, and bottles, to hunt down defective seals, bad corks, and other leaks that might admit contamination or lose contents. Sometimes, too, after long storage, certain types of internal spoilage occur; X-rays might be used for re-inspecting such material before shipping, to eliminate packages that were good to begin with but have gone bad while waiting to move.

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Science News Letter, July 23, 1938

POPULATION

Oldest American Cities Are on the Pacific Coast

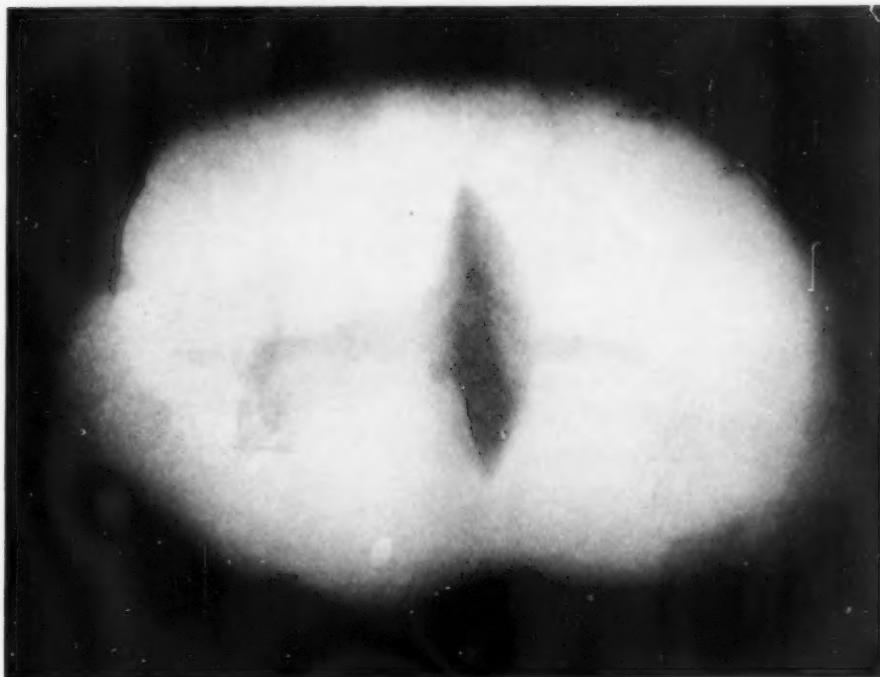
RESIDENTS of St. Augustine, Fla., may be surprised to hear it, but Long Beach, Calif., has just been pronounced an oldest city—the oldest, in fact, of America's large cities, with San Diego running a close second.

These two are the oldest, from the standpoint not of date of settlement, however, but of age of their residents. Metropolitan Life Insurance Company statisticians are the authorities for the new oldest city titles. They report that almost one-tenth—9.2 per cent.—of Long Beach's population is over 65 years old. In San Diego the proportion of residents over 65 years is 9.1 per cent.

Spokane, Wash., is third in order of age of its inhabitants, and, in fact, all the Pacific Coast cities have pretty old populations. The reason, of course, is not hard to find. An equable climate and facilities for rest and recreation for which these cities are distinguished attract old people who have retired and are able to live on their income or savings. For the same reason, the highly industrialized city of Gary, Ind., is the youngest of all the nation's cities of over 100,000 population. Only 1.7 per cent. of its inhabitants are over 65 years old.

Science News Letter, July 23, 1938

Princeton University has acquired a rare Moslem medical book written in the tenth century and carried off from the Near East by Crusaders.



FALSE HEART

The eye of the X-ray said: "This potato is hollow-hearted, unfit for baking."

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Wilson, Henry Van Peters, 1863-
University of North Carolina

1938. Behavior of the epidermis in sponges (*Microciona*) when treated with narcotics or attacked by aquarium degeneration

J. Exp. Zool., v. 79, no. 2, Oct. 5

The epidermis including the marginal films, peripheral sheets of cytoplasm with a single layer of nuclei, is syncytial in reunion sponges (*Microciona*). The cytoplasm is, typically, reticulate in appearance.

Under the influence of chloral the syncytial epidermis may break up into cell-like pieces, owing to excessive vacuolar degeneration between nucleated regions. The degeneration is traceable to changes in the microscopic architecture of the cytoplasm. In such cases the nuclei seem to exert a directive influence on the progress of vacuolation. The cytoplasm eventually loses its optical structure and the nuclei also degenerate. Vacuolar degeneration may be diffuse without the production of cell-like pieces.

Chloreton has a similar but not identical effect. A non-nucleated area may divide into pieces, showing that nuclear control over vacuolation and consequent cytoplasmic division is unnecessary for such division. Aquarium degeneration may lead to results very similar to those induced by drugs.

Epidermal lines are again recorded and interpreted as structures produced through rearrangement of the meshes (alveoli probably) of the epidermal membrane.

Histology, epithelial tissue

Microciona

Physiology, degeneration

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*First Glances at New Books

Music

THE STORY OF MUSICAL INSTRUMENTS FROM SHEPHERD'S PIPE TO SYMPHONY—H. W. Schwartz—*Doubleday, Doran*, 365 p., \$3.50. A most readable account of the evolution of the orchestra. Taking the types of instrument in turn, the author discusses their improvement through the centuries, with lively incidents to color the narrative. He also explains the plan of a symphony orchestra, and in general tells what the concert-goer may want to know.

Science News Letter, July 23, 1938

Horticulture—Architecture

YOUR HOME AND YOU—Jay Carver Bossard—*Macrae-Smith*, 127 p., \$1.50. How to arrange and take care of a home, inside and out; from interior decoration to planting care of the grounds. Compact and practical.

Science News Letter, July 23, 1938

Medicine

HANDBOOK ON SOCIAL HYGIENE—William Bayard Long and Jacob A. Goldberg, eds.—*Lea & Febiger*, 442 p., illus., \$4. Timely and authoritative, this compilation for which 19 authors are responsible covers the campaign, legal, welfare and educational aspects incidental to the medical phases.

Science News Letter, July 23, 1938

Engineering

MOTION PICTURE SOUND ENGINEERING—Research Council of the Academy of Motion Picture Arts and Sciences—*Van Nostrand*, 547 p., \$6.50. A series of lectures presented to classes in sound engineering enrolled under the Research Council of the Academy of Motion Picture Arts and Sciences. The different chapters are written by different sound engineers. The book is profusely illustrated.

Science News Letter, July 23, 1938

Psychology

MECHANICAL ABILITY OF DEAF CHILDREN—Mildred B. Stanton—*Teachers College*, 65 p., \$1.60. An experimental study, designed to evaluate the mechanical ability of deaf children, as an aid in giving them industrial training.

Science News Letter, July 23, 1938

History

STORY OF CIVILIZATION—Carl L. Becker and Frederic Duncalf—*Silver Burdett*, 897 p., illus., \$2.40. Emphasizing the evolution of man's material conquest of the earth, this text book gives a clearer panorama of history than the old-fash-

ioned texts that dealt in political eras more exclusively. Illustrations, some in color, are excellent. The idea of including novels and biographies in the suggested readings, at chapter ends, is a good one.

Science News Letter, July 23, 1938

Biology

GENETICS: AN INTRODUCTION TO THE STUDY OF HEREDITY (4th ed.)—Herbert Eugene Walter—*Macmillan*, 412 p., illus., \$3. This new edition of a successful textbook shows the effects of progressive pruning, new growth, and general improvement of what was initially a well-conceived, clearly presented work.

Science News Letter, July 23, 1938

Archaeology

THE KEPPEL FISH DAM—T. T. Waterman and A. L. Kroeber—*Univ. of Calif. Press*, 35 p., 25 c. Rituals of northwest California Indians.

Science News Letter, July 23, 1938

Anthropology

COMING INTO BEING AMONG THE AUSTRALIAN ABORIGINES—M. F. Ashley-Montagu—*Dutton*, 362 p., \$5. Highly praised in a foreword by Prof. Malinowski, this study of beliefs regarding procreation sheds light on primitive thinking and also on primitive social organization. What Australian natives believe on this subject has been controversial. This study marshals the evidence and evaluates it clearly.

Science News Letter, July 23, 1938

Geology

GLACIAL HISTORY OF THE STREAMS OF SOUTHEASTERN MICHIGAN—James William Bay—*Cranbrook Institute of Science*, 72 p., 3 pl., folded map, 75 c.

Science News Letter, July 23, 1938

Medicine

AN INTRODUCTION TO CLINICAL SCOTOMETRY—John N. Evans—*Yale Univ. Press*, 266 p., \$4.

Science News Letter, July 23, 1938

Biology

THE HUMAN ORGANISM AND THE WORLD OF LIFE: A SURVEY IN BIOLOGICAL SCIENCE—Clarence W. Young and others—*Harper*, 657 p., illus., \$3. Most textbooks in general biology treat of the human organism either incidentally or not at all, particularly as regards the mental life of man. This book puts special emphasis on human beings as objects of biological study; it is significant that its senior author is a psychologist.

Science News Letter, July 23, 1938

Botany

OUR SHADE TREES—Ephriam Porter Felt—*Orange Judd*, 187 p., illus., \$2. If you own a tree you own something as complex as a horse and as much in need of understanding and proper care if you are to get due value out of it. This book is packed with information about trees both individually and in mass, and offers plain and practical counsel on their care.

Science News Letter, July 23, 1938

Chemistry

CHEMISTRY AND ITS WONDERS—Oscar L. Brauer—*American Bk.*, 760 p., illus., \$2. Here is an elementary chemistry text, well illustrated and indexed, designed for students who are going to take only one course in chemistry.

Science News Letter, July 23, 1938

Physics

SURVEY OF PHYSICAL SCIENCE FOR COLLEGE STUDENTS—Paul McCorkle—*Blakiston's*, 471 p., illus., \$2.75. A text for survey and orientation courses as developed at State Teacher's College, West Chester, Pa. Appreciation of science in the modern environment is the underlying theme.

Science News Letter, July 23, 1938

Conservation

DAMS AND CONTROL WORKS (2d ed.)—Bureau of Reclamation, U. S. Dept. Interior—*Govt. Print. Off.*, 261 p., illus., \$1. How the various great dams in the United States were built, what materials were used, and why, are all described in this well-illustrated book; valuable to the engineer, irrigation expert, and geologist.

Science News Letter, July 23, 1938

Sociology

MEN WITHOUT WORK: A REPORT MADE TO THE PILGRIM TRUST—*Cambridge* (Macmillan), 447 p., \$3. See page 54.

Science News Letter, July 23, 1938

Radio

POLICE COMMUNICATION SYSTEMS—V. A. Leonard—*Univ. Calif. Press*, 589 p., illus., \$5. A book on what the police radio technician should know. Contains practical advice, technical and historical information.

Science News Letter, July 23, 1938

Economics—Engineering

THE FUTURE OF STATE PLANNING—National Resources Committee—*Govt. Print. Off.*, 117 p., 25 c. A useful review of planning activities, with directories and bibliographies of state planning agencies.

Science News Letter, July 23, 1938



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*As Developed From Dr. Draeger's Design and Made Under
the Direction of Science Service*

THIS reading machine is designed especially for use with the internationally standardized 35 mm. microfilm such as produced by BiblioFilm Service. It magnifies the image 12 diameters upon a screen of superior definition, making microfilm easier to read in many cases than the original material. Mere turning of the handle changes the pages forward or backward with great speed. Short strips of microfilm can be placed in it with facility,

while long runs of up to 1500 pages, upon reels, can be placed on the machine in a few seconds. Positive and negative microfilm can be read with ease. Special features include:

The unique revolving head allows the reading of microfilm whatever the orientation of the image upon the film.

The machine is also a wall projector, since the
(CONTINUED ON NEXT PAGE)



THE ARGUS
MICROFILM READER

(CONTINUED FROM OTHER SIDE)

simple flipping of a panel in its head allows the image to be projected horizontally to any suitable surface so that a group can view the image in such

enlargement as desired. The one machine at no extra cost is *both a translucent screen reader and a projector.*

Easily accessible focusing knob allows exact focus to be obtained at all times.

Microfilm of 16 mm. size can also be read upon screen or by projection. Newspaper microfilm can also be read. The *whole page* is visible at the same time.

In finish and style, the machine is a decoration to any office, home or library. It is in attractive dark brown with chromium trim. It occupies little more space than a typewriter upon desk or table.

Since it costs \$75—*less than a typewriter*—individuals are justified in making this microfilm reading machine part of their permanent equipment. Organizations will wish to have several for use in various locations.

Through microfilm copying services in many libraries of the world, this reading machine unlocks much of the literature, both printed and manuscript, in great collections. With it you may own and view, in authentic facsimile, many of the world's great literary and intellectual treasures.

Science Service is pleased that it has been successful in its effort to make this new tool of research and scholarship available at a reasonable price. As a convenience to the growing number of microfilm users and a service to the scholarly world, it is facilitating the distribution of this microfilm reading machine for a limited period.

Send for Complete Specifications, Without Obligation

SCIENCE SERVICE
2101 Constitution Ave.
Washington, D. C.

Kindly send me specifications of the new Argus Microfilm Reader.

NAME _____

STREET ADDRESS _____

BY _____

CITY AND STATE _____